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(56) Documents cited

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(58) Field of search

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(54) **Water-driven power generator**

(57) A water-driven power generator is provided with driving means which comprise an endless loop (10) carrying paddles or vanes (18) at spaced-apart intervals over its entire length. The loop (10) is arranged to pass round a pair of spaced-apart guide wheels or rollers (12, 16) which cause at least some of the paddles (18) at any one time to lie transversely within a channel (20) of slightly greater width than the width of the paddles (18). The paddles (18) are driven along the channel (20) by water flowing therethrough during operation of the driving means.

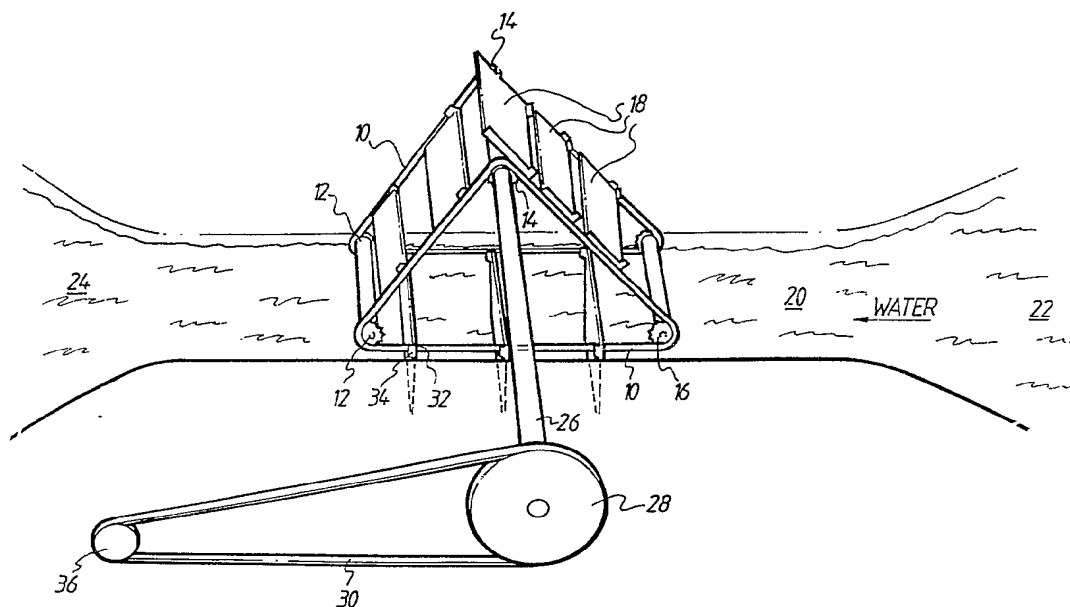
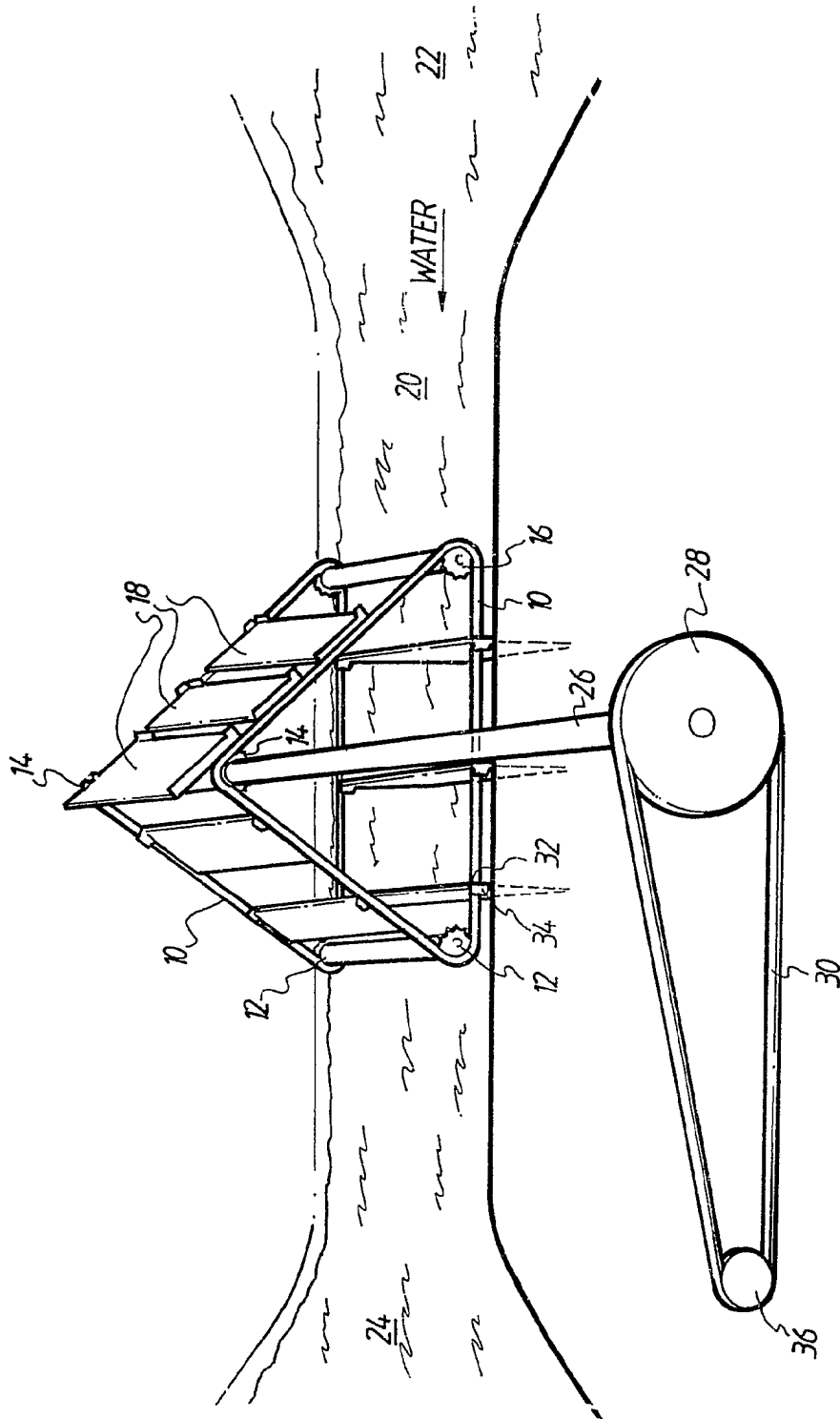


FIG.1

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2-5

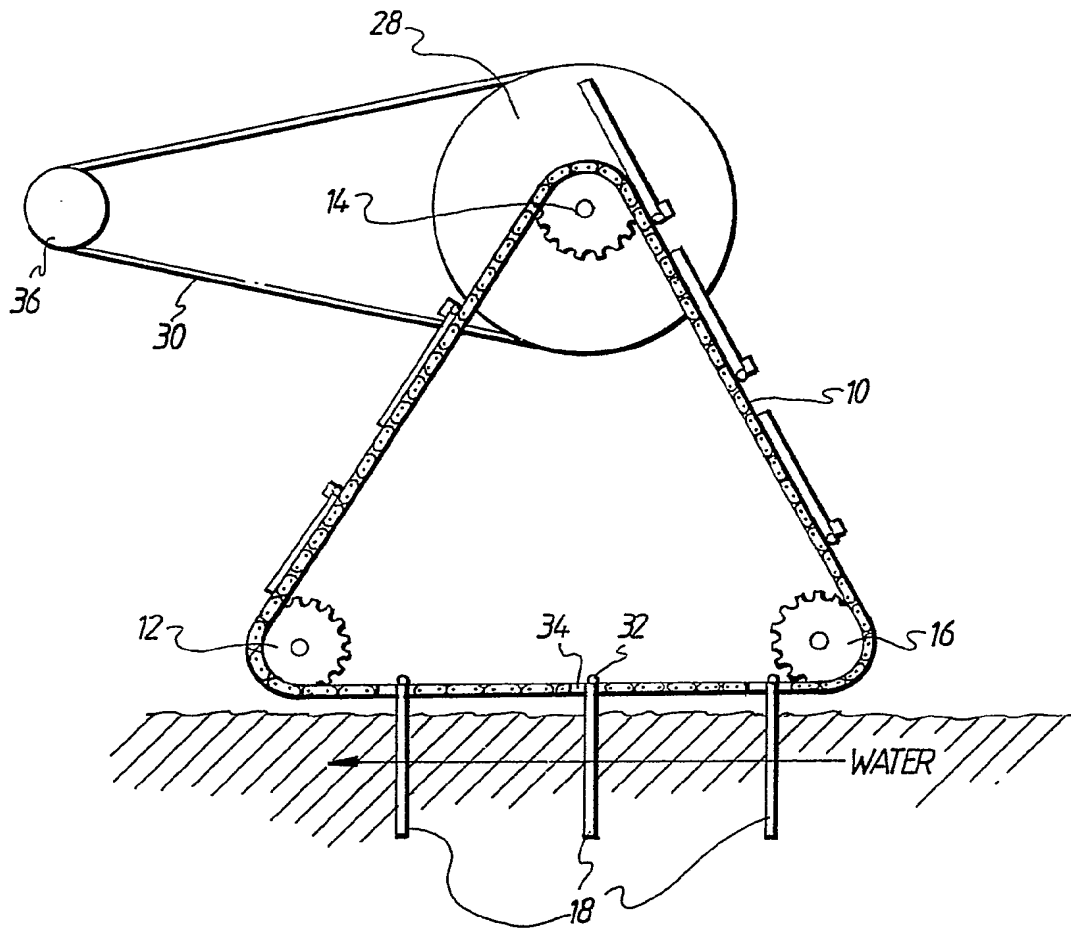


FIG. 2

3-5

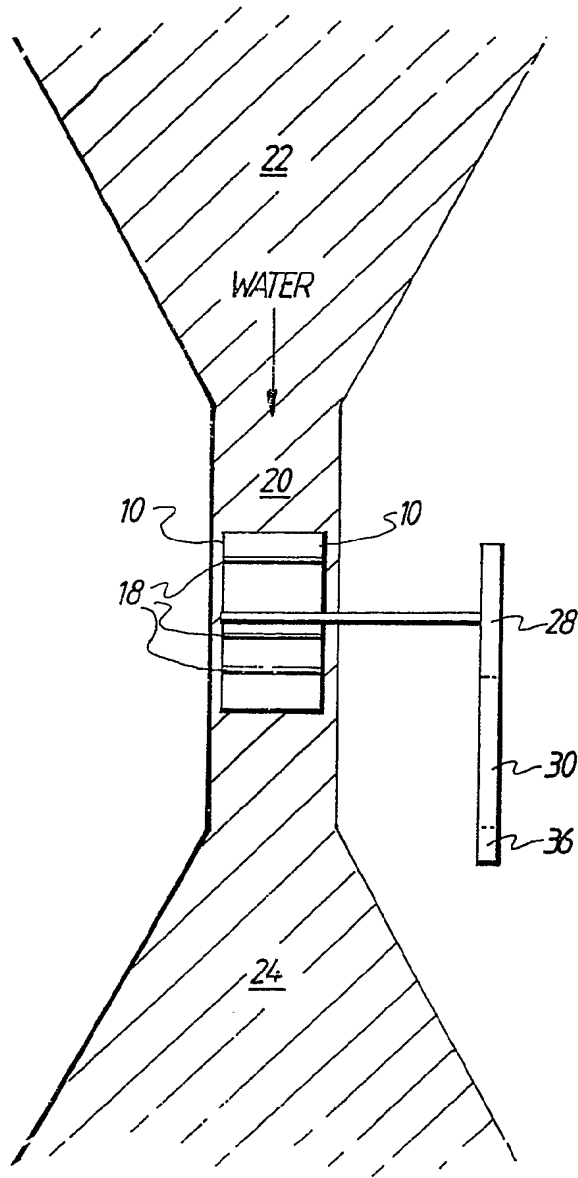
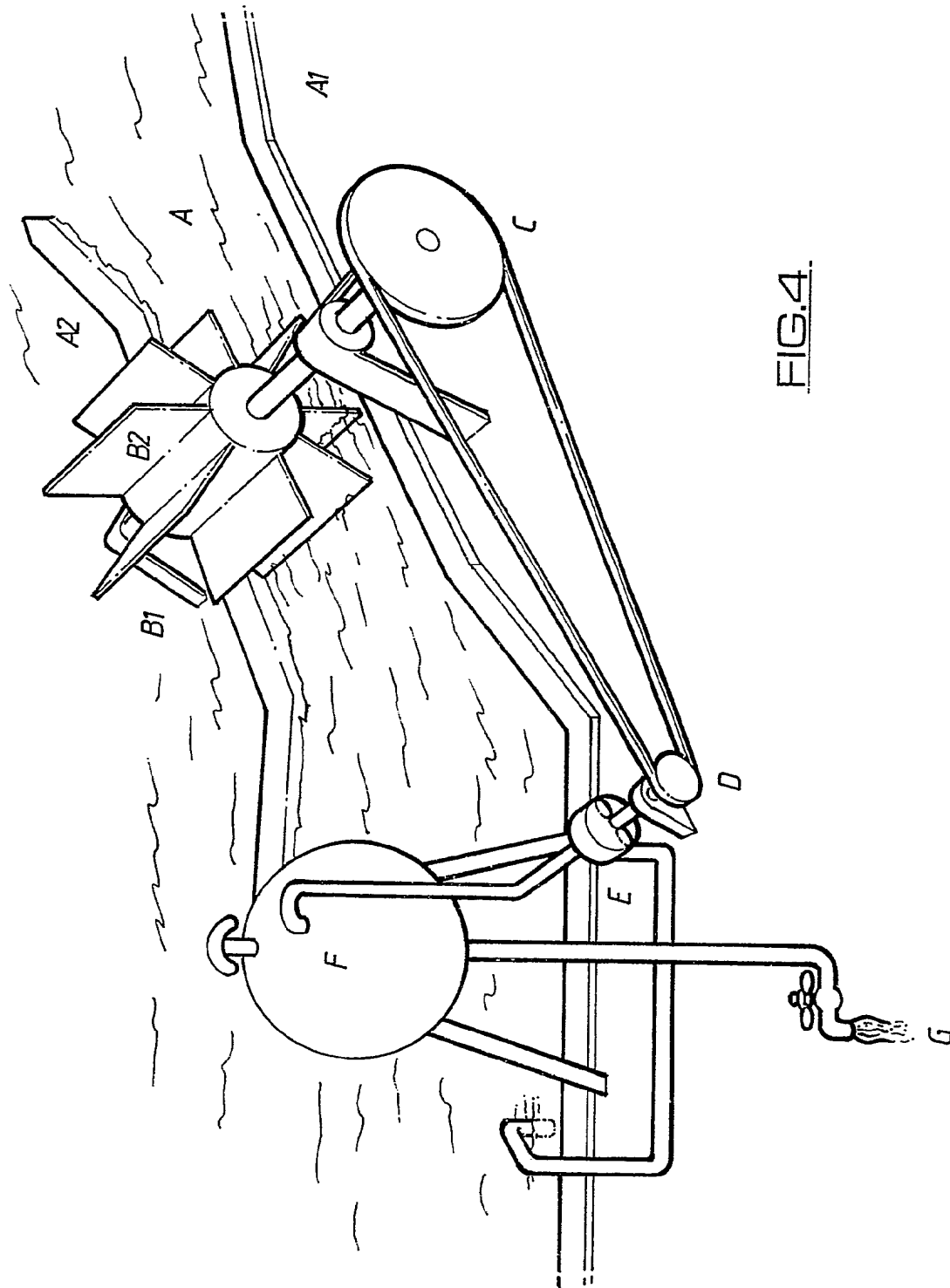


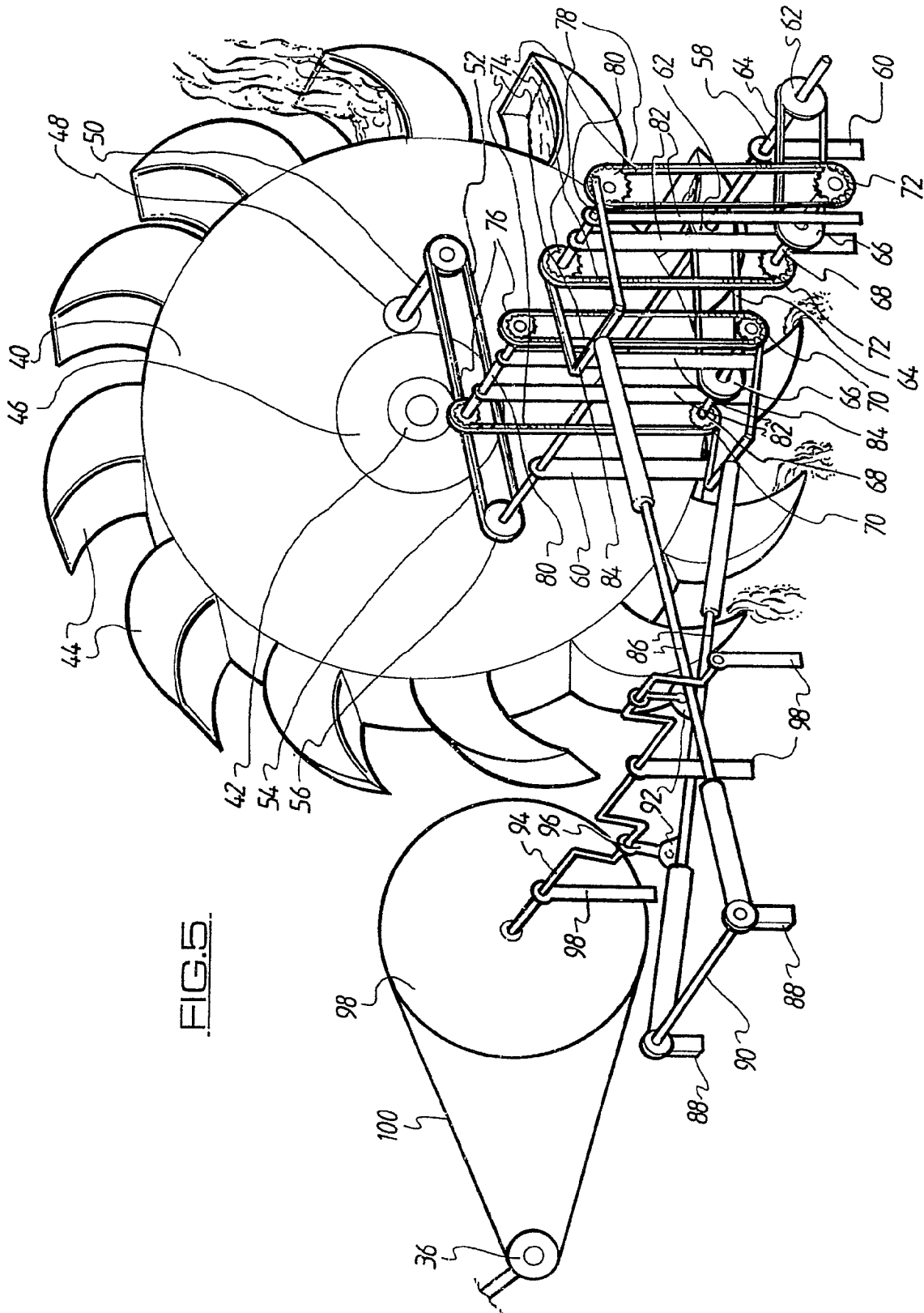
FIG. 3

20 4 96

4-5



5-5



Water-driven power generator

This invention relates to water-driven power generators, its aim being to produce a generator wherein the driving means make more efficient use than hitherto of a moving stream of water. The invention can be used in many different circumstances, but is particularly useful where a stream or river having a strong current is available.

According to the invention, a water-driven power generator is provided with driving means which comprise an endless loop carrying paddles or vanes at spaced-apart intervals over its entire length, the loop being arranged to pass round a pair of spaced-apart guide wheels or rollers which cause at least some of the paddles at any one time to lie transversely within a channel of slightly greater width than the width of the paddles, the paddles being driven along the channel by water flowing therethrough during operation of the driving means.

Preferably the paddles or vanes are pivotally mounted on the loop so that they lie at right angles to the latter while they are moving through the channel and lie flat against the loop during such time that they are clear of the channel.

The loop may comprise one or more chains.

An example of a water-driven power generator in accordance with the invention is shown in the accompanying

drawings, in which:

Figure 1 is a perspective view of the apparatus;

Figure 2 is a side view of the apparatus; and

Figure 3 is a plan view of the channel through which  
5 the water flows so as to drive the paddles or vanes.

The water-driven power generator shown in the drawings comprising an endless chain 10 which passes round three sets of wheels or rollers 12, 14 and 16 so that the chain moves over a triangular path as shown in Figure 2. The  
10 chain 10 is shown only diagrammatically in the drawings, and it may in fact comprise two separate chains running in synchronism and in parallel with each other. The precise construction of the chain is not, however, important and for this reason no further details of it will be given.

15 In order that the chain may be driven so as to generate electrical or mechanical power, a number of paddles or vanes 18 are carried on the chain at spaced-apart intervals over its entire length. These vanes or paddles are so mounted on the chain that at least some of the paddles lie  
20 transversely within a channel 20 through which a stream of water passes. The channel has a width which is slightly greater than the width of the paddles 18, and it will be noted that at least three paddles lie within the channel at any one time whether the chain is moving or is stationary. This means  
25 that, unlike a water wheel where each paddle dips into the water only momentarily, the paddles 18 dip into the water



stream for a comparatively long period and are moved through the full length of the channel 20 before rising out of the water. As a result, more power is extracted from the water stream than is possible using a water wheel.

5                In order to accelerate the flow of water through the channel 20, the incoming stream of water is preferably funnelled by a tapering portion 22. Similarly, the outlet end of the channel 20 leads directly into an outwardly-flared exit 24.

10              The wheels 12, 14 and 16 will normally be gear wheels, the wheels 14 in the present instance being joined by shaft a 26 which is provided with a drive pulley 28 at one end. A belt 30 passing round the pulley 28 then serves to drive the shaft of the power take-off 36 which can be of  
15              conventional construction for the required use, whether to generate electricity, or to provide mechanical power or drive, and which is not therefore shown in the drawing.

              Although it is perfectly acceptable for the vanes or paddles 18 to be fixed rigidly to the chain 10, it is  
20              preferable for them to be pivotally mounted at 32 and to be provided with lugs or ledges 34 which bear against the chain 10 when the paddles are passing through the channel 20. Once, however, the paddles have emerged from the water in the channel 20, they fall back under gravity into the position  
25              shown in the upper part of Figure 2 where they lie against the chain 10. Then, when they pass round the upstream wheels 16,

the paddles drop into a position where they are ready to dip into the water within the channel 20.

The invention can be applied to the generation of electricity or pumping of water both for domestic and industrial purposes. It is, however, particularly advantageous in circumstances where the output of electricity required is not large and where it would be uneconomic to provide generators driven by water turbines. Alternatively it could be used to provide water pumping facilities for small villages or farms to pump water from wells or the river into a water tower for future supply.

It will be appreciated that the shaft 26 could be connected to the wheels 12 or 16 instead of the wheels 14. The length of the chain between the wheels 14 and the wheels 16 may be substantially upright, so that the paddles 18 drop into a position substantially perpendicular to the chain when they pass over the top wheels 14.

Further water driven apparatus will now be described with reference to the other Figures of the accompanying drawings, in which :

Figure 4 is a perspective view of further water-driven apparatus; and

Figure 5 is a perspective view of a proposed power transmission for such an apparatus.

A further construction is illustrated in Figure 4 which shows a water wheel B1 mounted over a channel A between

a river bank A1 and a funnelling baffle A2. Paddles B2 of the water wheel B1 are spaced apart therearound, and those paddles B2 which are for the time being on the underside of wheel B1 are immersed in the water of the channel A so that the flow of the water rotates the wheel B1 in a clockwise sense as viewed in Figure 4. The water wheel B1 is fixedly connected to a coaxial pulley C which is in turn connected by a belt to a further pulley D. Pulley D rotates a push-pull pump E which pumps water from the river or a well into a raised tank F. The tank F then provides piped water G for a remote farm, for example.

Figure 5 shows a proposed power transmission to transmit the power of the water wheel to the power take-off, from which a pump, for example, may be operated directly to raise the level of a water supply, or from which a generator may be operated to provide electrical power for a power grid.

A large water wheel 40 is mounted on an axle 42. The axle 42 is attached to a support structure which is not shown in Figure 5. The water wheel 40 has eleven scoop-shaped buckets 44 mounted at regular intervals round its circumference, such that when the wheel 40 is rotated in a clockwise sense the buckets are filled by water flowing from a supply channel. A second smaller drive wheel 44 is securely attached to one side of the water wheel, such that they have the same axis and rotate at the same speed.

A further wheel 48 which has a smaller diameter than

the drive wheel 46 is mounted such that it touches the drive wheel 46 at one point along its circumference. The wheel 48 is attached through its axis to one end of a shaft 50. The other end of the shaft 50 is attached to the axis of a pulley wheel 52. The circumference of the pulley wheel 52 has one end of a drive belt 54 round it. The other end of a the drive belt 54 goes round a further pulley wheel 56. The pulley wheel 56 is attached through its axis to a rotating shaft 58. The shaft 58 is held rotatably in position by supports 60. Two take-off pulley wheels 62 are mounted on the shaft 58. The circumferences of the take-off pulley wheels 62 are respectively in contact with two belts 64. The other ends of the belts 64 go round two respective pulley wheels 66.

The pulley wheels 66 are situated in the middle of two respective shafts 68. At their respective ends the shafts have pairs of toothed wheels 70 and 72 respectively. The pairs of toothed wheels 76 and 78 are at one end of endless loop chains 74. The other ends of the chains 74 go round respective pairs of toothed wheels 76 and 78. The pairs of tooth wheels 76 and 78 are joined by two respective shafts 80. The shafts 80 are held in a position above the two shafts 66 by two supports 82 on each shaft.

The pairs of toothed wheels 70 and 78 are respectively joined to the U-shaped ends 84 of two power rods 86. The U-shaped ends 84 are movably connected to the toothed wheels on their outside surface and to one side of the axis of

rotation of the pairs of wheels 70 and 78.

The other end of the power rods 86 are movably connected to supports 88. The rods 86 are joined between the supports 88 by an axle 90. The rods 86 are equipped with  
5 flanges 92 on their upper side, which are connected to a crank shaft 94 by rods 96. The crank shaft 94 is rotatably supported on supports 98. One end of the crank shaft is connected to the axis of a large fly wheel 98. The fly wheel 98 is connected to the power take-off 36 by a belt 100.

10 The power transmission of Figure 5 functions as follows. Falling water fills the buckets 44 of the wheel 40, causing the wheel to rotate under the influence of gravity. The wheel 40 in turn rotates the drive wheel 46. The drive wheel 46 then rotates the wheel 48 by edge contact. The  
15 rotation of the wheel 48 is transmitted to the pulley wheel 52 by shaft 50.

The pulley wheel 52 turns the drive belt 54 and thus rotates the pulley wheel 56 and the shaft 58. The shaft 58 rotates the take-off pulley wheels 62 which drive the belts 64  
20 and the pulley wheels 66.

The pulley wheels 66 rotate respective shafts 68 and pairs of toothed wheels 70 and 72 respectively. The toothed wheels 70 and 72 drive chains 74 and thereby drive toothed wheels 76 and 78 respectively and the two shafts 80. The  
25 pairs of wheels 70 and 78 by rotating push the drive rods 86 backwards and forwards. This motion of the rods 86 rotates

the crank shaft 94 via rods 96. The crank shaft 94 then rotates the fly wheel 98 which in turn rotates the power take-off 36 via the belt 100.

Claims

1. A water-driven power generator is provided with driving means which comprise an endless loop carrying paddles  
5 or vanes at spaced-apart intervals over its entire length, the loop being arranged to pass round a pair of spaced-apart guide wheels or rollers which cause at least some of the paddles at any one time to lie transversely within a channel of slightly greater width than the width of the paddles, the paddles being  
10 driven along the channel by water flowing therethrough during operation of the driving means.
2. A water driven power generator according to claim 1, in which the paddles or vanes are pivotally mounted on the loop so that they lie at right angles to the latter while they  
15 are moving through the channel and lie flat against the loop during such time that they are clear of the channel.
3. A water-driven power generator according to claim 1 or claim 2, in which the loop may comprise one or more chains.
4. A water-driven power generator according to any  
20 preceding claim, in which the channel where the paddles are has been created from the narrowing of a larger stream.
5. Water-driven apparatus comprising a paddle drive, a fluid pump connected to be driven by the paddle drive, and a tank mounted at a position higher than the paddle drive and  
25 connected to receive water from the fluid pump.
6. A water-driven power generator according to any

preceding claim in which the generator is equipped with a power transmission which comprises a drive means rotated by the generator, the drive means being connected directly or indirectly to drive rods which thereby move longitudinally to and fro, in anti-phase with one another, and the drive rods are connected to respective cranks of a crank shaft which provides a power drive.

5 7. A water-driven power generator substantially as described herein with reference to Figure 1 to 3 of the accompanying drawings.

10 8. A water-driven power generator substantially as described herein with reference to Figure 4 of the accompanying drawings.

15 9. A water-driven power generator substantially as described herein with reference to Figure 5 of the accompanying drawings.



**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

Application number

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**Relevant Technical fields**

(i) UK CI (Edition L ) F1T (TC, TEA, TED, TEX) ; F1S

(ii) Int CI (Edition 5 ) F03B 9/00

Search Examiner

M D WALKER

**Databases (see over)**

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

Date of Search

14 JULY 1993

Documents considered relevant following a search in respect of claims 1-4, 6

Category (see over)	Identity of document and relevant passages		Relevant to claim(s)
X	GB 1165961	(GARRETT) page 2 lines 21-28	1,3,4
Y	GB 1165961	(GARRETT) page 2 lines 21-28	2
Y	GB 0217252	(WELLERT) page 1 lines 70 etc	2
X	US 4552507	(KLUTE) Figure 1, column 6 line 18 to column 7 line 21	1,3
Y	US 4552507	(KLUTE) Figure 1, column 6 line 18 to column 7 line 21	2
X	US 4053253	(COFFER) column 4 line 39 to column 5 line 11	1,2,3
X	US 3882320	(SCHMELLER) column 2 lines 1-39	1,3
X	DE 3021591 A1	(BRUNSCH) pages 5 and 6	1,2

Category	Identity of document and relevant passages	Relevant to claim(s)

### Categories of documents

**X:** Document indicating lack of novelty or of inventive step.

**Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category.

**A:** Document indicating technological background and/or state of the art.

**P:** Document published on or after the declared priority date but before the filing date of the present application.

**E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.

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